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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,582	04/28/2006	Michael A. Morich	PHUS030432US	2994
38107 7590 09/20/2007 PHILIPS INTELLECTUAL PROPERTY & STANDARDS 595 MINER ROAD CLEVELAND, OH 44143			EXAMINER VARGAS, DIXOMARA	
			ART UNIT 2859	PAPER NUMBER
			MAIL DATE 09/20/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/595,582

Applicant(s)

MICHAEL MORICH ET AL.

Examiner

Dixomara Vargas

Art Unit

2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 13, 14, 17 and 18 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 7-12, 15, 16, 19 and 20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 04/28/06
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application
- ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 6, 13-14 and 17-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Agilandam et al (US 6,995,559 B2).

With respect to claim 1, Agilandam discloses a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: determining a per-slice B_1 field value for each slice that is representative of the B_1 field over a selected area of the slice; determining an adjusted per-slice radio frequency excitation for each slice that adjusts the B_1 field value for the slice to a selected value; acquiring magnetic resonance imaging data for each slice using the adjusted per-slice radio frequency excitation for that slice (Column 2, lines 40-67); and reconstructing the acquired magnetic resonance imaging data into a reconstructed image representation (Column 3, lines 25-27).

3. With respect to claim 2, Agilandam discloses the step wherein the determining of a per-slice B_1 field value for each slice comprises: determining the B_1 field across at least the selected

area of the slice; and computing an aggregate value of the determined B_1 field across the selected area of the slice (Column 3, lines 1-27).

4. With respect to claim 3, Agilandam discloses the step wherein the computing of an aggregate value comprises: computing an average, median, or root-mean-square value of the determined B_1 field across the selected area of the slice (Column 3, lines 1-27).

5. With respect to claim 6, Agilandam discloses the step wherein the determining of the B_1 field across at least the selected area of the slice comprises: measuring a B_1 map of at least the selected area of the slice with one of (1) the region of interest of the imaging subject disposed in the radio frequency coil, (2) the region of interest of a representative distribution of imaging subjects acquired a priori in the radio frequency coil, and (3) a spatially non-uniform compartmentalized phantom model of at least the region of interest of the imaging subject disposed in the radio frequency coil (Column 3, lines 1-27).

6. With respect to claim 13, Agilandam discloses a magnetic resonance imaging apparatus comprising (as seen on Figure 4): a main magnetic field coil generating a main magnetic field (#410); magnetic field gradient coils selectively generating magnetic field gradients (#416); a radio frequency coil arranged to generate a B_1 magnetic field in a region of interest of an associated imaging subject (#418); a radio frequency transmitter selectively energizing the radio frequency coil (#404); a radio frequency receiver selectively sampling the radio frequency coil (#420); and a processor programmed to perform the method of claim 1 (#402).

7. With respect to claim 14, Agilandam discloses a magnetic resonance imaging apparatus for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject, the apparatus comprising (as seen on Figure 4): a radio frequency coil arranged

to generate a B_1 magnetic field in the region of interest (#418); a means for determining a per-slice B_1 field value for each slice that is representative of the B_1 field over a selected area of the slice (Abstract; Figure 4, #402); a means for determining an adjusted per-slice radio frequency excitation for each slice that adjusts the B_1 field value for the slice to a selected value (Column 3, lines 1-27); a means for acquiring magnetic resonance imaging data for each slice using the adjusted per-slice radio frequency excitation for that slice; and a means for reconstructing the acquired magnetic resonance imaging data into a reconstructed image representation (Column 3, lines 1-27; Figure 4, #402).

8. With respect to claim 17, Agilandam discloses the apparatus wherein the means for determining a per-slice B_1 field value for each slice comprises: a means for determining a value of a figure of merit for each slice that is representative of the B_1 field over a selected area of the slice (Column 3, lines 1-27; Figure 4, #402 and #404).

9. With respect to claim 18, Agilandam discloses the apparatus wherein the means for determining a value of a per-slice B_1 field figure of merit for each slice that is representative of the B_1 field over a selected area of the slice comprises: a statistical aggregation means for calculating an aggregate value representative of the B_1 field over the selected area of the slice (Column 3, lines 1-27; Figure 4, #402 and #404).

Allowable Subject Matter

10. Claims 4-5, 7-12, 15-16 and 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

a. With respect to claim 4, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: the step wherein the determining of the B_1 field across at least a selected area of the slice comprises: computing the B_1 field numerically using a model of the radio frequency coil and a non-homogeneous model of the imaging subject, the non-homogeneous model of the imaging subject employing different conductivity and permittivity values for different materials of which the imaging subject is formed in combination with the remaining limitations of the claims 1 and 2 above.

b. With respect to claim 5, the claim has been found allowable due to its dependency on claim 4 above.

c. With respect to claim 7, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: the step wherein the determining of a per-slice B_1 field value for each slice comprises: determining a value of a figure of merit for each slice that is representative of the B_1 field

over a selected area of the slice in combination with the remaining limitations of the claim 1 above.

d. With respect to claim 8, the claim has been found allowable due to its dependency on claim 7 above.

e. With respect to claim 9, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: the step wherein the determining of an adjusted per-slice radio frequency excitation for each slice includes determining an adjusted radio frequency excitation for each slice that adjusts the per-slice B_1 field value to a selected value that is substantially the same for a plurality of slices for which imaging data is acquired, the method further comprising: determining a specific absorption rate based on the adjusted per-slice radio frequency excitations; and conditional upon the determined specific absorption rate exceeding a regulatory safety limit, repeating the determining of an adjusted per-slice radio frequency excitation for each slice using one of a lower selected value of the per-slice B_1 field value and adjustment of at least one other imaging sequence parameter to reduce the specific absorption rate in combination with the remaining limitations of the claim 1 above.

f. With respect to claim 10, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of

interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: the step wherein the adjusted per-slice radio frequency excitations are adiabatic radio frequency excitations, and the determining of the adjusted adiabatic radio frequency excitations comprise: for each slice, computing an adjusted adiabatic radio frequency excitation that substantially corrects for a variation of the B_1 field across the selected area of the slice to provide more uniform flip angles in combination with the remaining limitations of the claim 1 above.

g. With respect to claim 11, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging method for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject using a radio frequency coil arranged to generate a B_1 magnetic field in the region of interest, the method comprising: the step further comprising: moving the associated imaging subject in a direction transverse to the slices, the determining of a per-slice B_1 field value, the determining of an adjusted per-slice radio frequency excitation, and the acquiring of magnetic resonance imaging data being repeated for a stationary slice position with the imaging subject moved relative to the stationary slice position between each repetition in combination with the remaining limitations of the claim 1 above.

h. With respect to claim 12; the claim has been found allowable due to its dependency on claim 11 above.

- i. With respect to claim 15, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging apparatus for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject, the apparatus comprising: the apparatus wherein the means for determining a per-slice B_1 field value for each slice comprises: an electromagnetic simulator receiving a digital model of the region of interest and the digital model of the radio frequency coil and estimating the B_1 field generated across the region of interest, the digital model of the region of interest mimicking non-uniform dielectric and conductivity properties of the region of interest in combination with the remaining limitations of the claim 14 above.
- j. With respect to claim 16, the claim has been found allowable due to its dependency on claim 15 above.
- k. With respect to claim 19, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance imaging apparatus for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject, the apparatus comprising: the apparatus wherein the means for determining an adjusted per-slice radio frequency excitation for each slice comprises: a table of adjusted per-slice radio frequency excitation versus slice position derived from the per-slice B_1 field values in combination with the remaining limitations of the claim 14 above.
- l. With respect to claim 20, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a magnetic resonance

imaging apparatus for performing multi-slice magnetic resonance imaging of a region of interest of an associated imaging subject, the apparatus comprising: the apparatus further comprising means for determining a specific absorption rate based on the adjusted per-slice radio frequency excitations; and conditional upon the determined specific absorption ratio exceeding a regulatory safety limit, repeating the determining of an adjusted per-slice radio frequency excitation for each slice using one of lower selected values of the per-slice B_1 field value and adjustment of at least one other imaging sequence parameter to reduce the specific absorption rate in combination with the remaining limitations of the claim 14 above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (571) 272-2252. The examiner can normally be reached on Monday to Thursday from 8:00 am. to 4:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2859

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Dixomara Vargas
Patent Examiner
Art Unit 2859